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## EUROPEAN PATENT APPLICATION

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㉚ A folding box.

㉛ A package of the folding box type comprising side wall panels of cardboard or similar material and end closure panels at each end of the side wall panels. A first set of creasing lines (51) in the longitudinal direction of the folding box define a polygonal folding box cross section. Perpendicular to said first creasing lines there is arranged a second set of creasing lines (53, 53a; 63, 63a) for defining transitions between the sleeve and a respective one of the end closure panels.

Adjacent end closure panels (54, 55; 64, 65) are separated by a punch line or a punched out portion (56; 66) which is defined as a punch line (58). The section of this punch line (58) adjacent to a real or an imaginary crossing point between said set of creasing lines is formed as a continuous panel outer edge line (57), the purpose of which is to uniformly distribute the strain of the plastics layer when folding out the panels (54, 55) in connection with the heat sealing of a membrane to the folding box end.

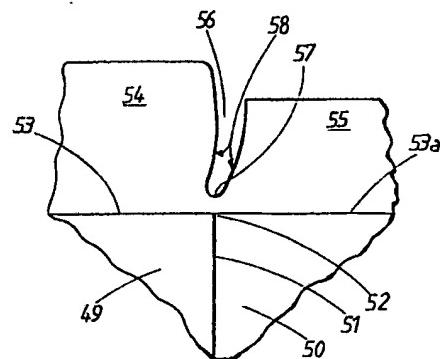


FIG. 5

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**Description****A folding box**

The present invention relates to a folding box of cardboard or similar material and more precisely a folding box of the type where a so called membrane is used for sealing and closing at least one end of the folding box.

Such membranes have been used for a long time within the present technical field. One example of the basic technique is described in applicant's own UK patent number 729 984.

The tightness obtained by means of an internal thermoplastic coating and in the actual case, by means of fibre wads at the corners, is fully acceptable for providing a good powder tightness and sufficient tightness for for instance deep frozen products as fruit juice.

The said basic technique within the field according to said UK patent has been developed by the applicant form time to time. Thus, for instance instead of having fibre wads it has been proposed "plastics fins" at the corners obtained by the combination of punching out the card board material and extruding of a coating.

In other folding box applications, for instance, according to US patent number 3 040 958 the folding box corner problems have been illustrated in connection with a discussion of providing sufficient counter pressure when folding the folding box end flaps inwards. It has been suggested a number of corner arrangements, one of which resembles the fibre wad corner mentioned and one using a specific creasing for creating reinforced, counter pressure resisting corner portions especially at the folding box end which is the last to be closed, i.e. after the product has been filled into the box. However, the other end is not critical according to said patent because then there is used a support placed inside the folding box.

The object of the present invention is to develop the said corner strucre further, so that with a minimum of modifications of existing production equipment and packing lines, respectively, it will be possible to accomplish even better sealing condition at the corners of the folding box, at one or both ends thereof. Especially the object is to provide better sealing possibilities when using a membrane of the type mentioned at the introduction.

The present invention provides a package, comprising a sleeve of card board or similar material formed of side wall panels and closure panels integral with the sleeve at each end thereof for forming a package of the folding box type, where in the longitudinal direction of the folding box, first creasing lines define a polygonal cross section of the folding box and second lines perpendicular to said first creasing lines define a transition regional between the sleeve and a respective one of the end closures.

The package is characterised in that each pair of adjacent end closure panels, in a region directly in register with one or said first folding denotation and at a predetermined distance from a straight line

interconnecting adjacent second increasing lines is provided with a continuous panel outer edge defining line which joins said panels.

In one embodiment a pair of said second creasing lines and the respective one of said first creasing lines belonging thereto start out from substantially one and the same point, which defines one corner at either folding box end.

In order to provide rational conditions for sealing, at least the internal side of the folding box is coated by a thermoplastics material, and a sealing membrane is sealed to the folding box by being attached to the plastics coating in the region between said panel outer boundery line and the corner belonging thereto at both ends of the folding box, and by being attached in a manner known per se to at least portions of the end closure panels.

In order to further optimize the closure and sealing conditions, respectively, the continuous panel outer boundary lines are placed such that when folding means outwards together with the end closure panels, there will be created a substantially uniform tensioning of the plastics coating in the region between a panel outer boundary line and the corner belonging thereto, meaning that the sealing area available at the corner will increase.

The minimum distance between a panel outer boundary line and the corner belonging thereto falls within the interval of approximatively 1,5-4 mm.

The invention will now be exemplified by reference to the accompanying drawings, where

Fig. 1 in a partial secion shows a corner region of a conventional folding box having the fibre wads mentioned at the introduction.

Fig. 2 is a corresponding partial section of another type of conventional fibre wad folding box,

Fig. 3 is a corresponding partial section of a folding box, according to the US patent number 3 040 954 mentioned at the introduction,

Fig. 4 shows another embodiment according to the same patent,

Fig. 5 shows a first embodiment of the arrangement according to the invention,

Fig. 6 shows another embodiment of a corner arrangement according to the invention,

Fig. 7 in a perspective view shows a filled folding box closed by a membrane and having folded out end closure flaps.

The reference numeral 10 in Fig. 1 denotes a side wall of a folding box blank of card board or similar material. The blank is coated by thermoplastics material at least at the side thereof which is to form the inside of the folding box. The numeral 11 denotes a portion of an adjacent side wall or side wall panel. Said panels are separated from each other by a creasing line 12 or a corresponding folding denotation. This folding denotation starts from a point 13, from which also a second set of creasing lines 15, 15a start out. Such creasing lines 15, 15a, define the boundary line between the side wall panels 10, 11

and the end closure penals 16, 17.

In the embodiment according to Fig. 1 there is a punched out region 18 between the panels 16, 17. The punch line 19 continuous with a portion 19a below the lowest point of the punch line 20. Between the point 13 and the lowest point of the punch line 19a there is formed a not broken-through material bridge 21, which when folding out flaps as will be explained later on, forms said "fiber wads" when the tension in the bridge portion 21 exceeds the tension strength or elongation strength.

In Fig. 2 there is shown another type of known corner structure. The numerals 22, 23 denote adjacent side wall panels, the numerals 24, 25, and 25a denote creasing lines or corresponding folding denotations. The numeral 26 denotes a punch line, which separates the end closure flaps 27 and 28. In a corresponding manner as in Fig. 1 there is formed a not broken-through material portion 29 the purpose of which is to form the said fiber wad.

In the corner structure according to Fig. 3 which represents a known structure, (US 3 040 958), there are used double creasing lines 29, 30 between adjacent side wall panels 31, 32. A creasing denotation 33, 33a separates the side walls panels 31, 32 from adjacent end closures 34, 35 and a punch line 36 separates the end closures 34, 35. Also in this case, there is formed a not brokenthrough material portion 37 between the lowest point of the punch line and the level defined by a line 33, 33a.

In Fig. 5 there is shown a further embodiment according to US patent number 3 040 958 where side wall panels 38, 39 are separated by double creasing lines 40, 41. The creasing lines 40, 42 define the transition line between the end closure flaps 43, 44 and the side walls 38, 39. A punch line 45 extends down to a point 46, where short creasing lines 47, 48 connect said point to the end points of the double creasing lines 40, 41.

In Fig. 5 there is shown a first embodiment of the corner structure according to the invention. Parts of the side wall panels 49, 50 are separated from each other by a creasing line 51, which is terminated upwards in a point 52, which falls on a straight line or even finds the border point between two further creasing lines 53, 53a forming part of the second set of the creasing lines for defining the transition between side walls and end closure panels.

In Fig. 5, adjacent end closure panels have been denoted 44, 45. In the actual case a relatively-wide punched out region 56 is formed between the panels.

The essential point in the present context, however, is that the region 57 of the end closure and panel outer boundary line cut out 56 defines a continuous section into said region 57. This means that the strain, elongation of the plastics coating, at the end closure panels in the region between the point 52 and the section 57 of the outer boundary line, is distributed uniformly, so that the plastics coating or plastics layer actually will be expanded or enlarged when the end closure penals 54, 55 are folded out to a horizontal position when sealing a membrane.

The tensioning obtained will be distributed uni-

formly because the deformation takes place along a continuous line 57 instead of taking place abruptly as in Fig. 1, 2 and 3, where frequently the plastics coating is torn up along a tear up line meaning insufficient sealing along the line and the formation of penetration or leaking channels. The force when folding out the end closure panels 54, 55 is transferred uniformly to the plastics layer in the region between the section 57 and the point 52, meaning that an unbroken sealing area comprising heat sealable thermoplastics is obtained and which area will also be the subject of an enlarging effect due to the folding out and the tensioning following thereafter, however, without any rupture of the plastics coatings.

The embodiment in Fig. 6, shows adjacent folding box side wall panels separated by a creasing line 61 which in a point 63 joins an integral creasing line 63, 63a, forming part of a second set of creasing lines. The end closure 64 and 65 are here separated by a somewhat narrower punched out region 66 which, however at the our part thereof is terminated by a continuous section 67 corresponding to the section 57 in Fig. 5. The so called end closure panel outer boundary line has been identified by the numeral 68.

In Fig. 7, there is shown a folding box 69 manufactured from the blank in Fig. 5. The folding boxes is filled and closed at the top by a sealing membrane 70 of for instance polyethylene coated thin paper. The membrane is sealed against portions of the end closure wall panels according to the invention, in the specific corner regions formed between continuous punched out sections 57 and adjacent crossing points 52 of crease lines 51 and 53, 53a respectively.

Although the invention has been exemplified in connection with specific embodiments, it is realised that modifications and variants are possilbe within the scope of the accompanying claims.

## Claims

- 45 1. A package comprising a sleeve of cardboard or corresponding material formed by side wall panels (49, 50; 59, 60) and end closure panels (54, 55; 64, 65) integral therewith at each end of the sleeve for forming a package (69) of the folding box type, where first creasing lines (51, 61) extending the longitudinal direction of the folding box define a polygonal cross section of the folding box and second creasing lines (53, 53a; 63, 63a) perpendicular to said first creasing lines define transitions between the sleeve and a respective one of the end closure flaps, characterised in that adjacent end closure panels, (54, 55; 64, 65) in a region directly in register with a first creasing denotation (51; 61) and at a predetermined distance from a straight line in register with adjacent second creasing lines (53, 53a; 63, 62a) have a continuous panel outer edge line (57; 67) joining the panels.
- 50
- 55
- 60
- 65

2. Package as in claim 1, **characterised in** that a pair of said second creasing lines (53, 53a; 63, 63a) and a first creasing line (51; 61) belonging thereto originate from one and the same point (52; 63), which defines a corner at either folding box end.

3. Package as in claim 2, where the package is coated by thermoplastics material at least at the inside thereof, **characterised in** that a closure membrane is sealed to the folding box by being attached to a plastic coating in a region between said panel outer edge lines (57; 67) at either folding box corner (52; 63) and by being attached to at least portions of the end closure panels in a manner known per se.

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4. Package as in claim 3, **characterised in** that the continuous section of the panel outer edge lines are placed such that when folding outwards together with the end closure flaps, there is obtained a substantially uniform tensioning of the plastics coating in the region between said panel outer border line section and a joining corner, whereby the sealing area available at the corner will increase.

5. Package as in claim 4, **characterised in** that the minimum distance between one of said sections of the panel outer border line and the joining corner is of the magnitud of 1,5 to 4 mm.

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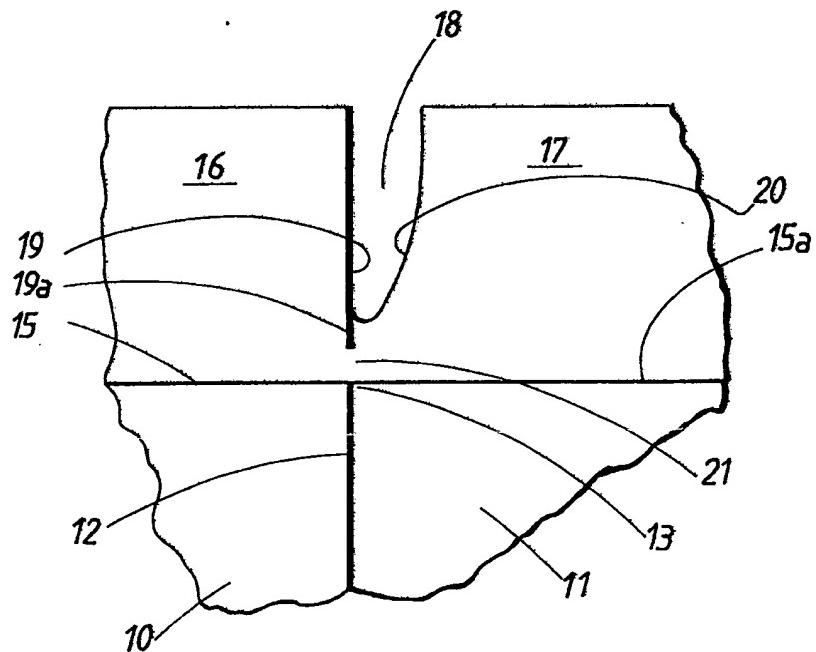


FIG. 1

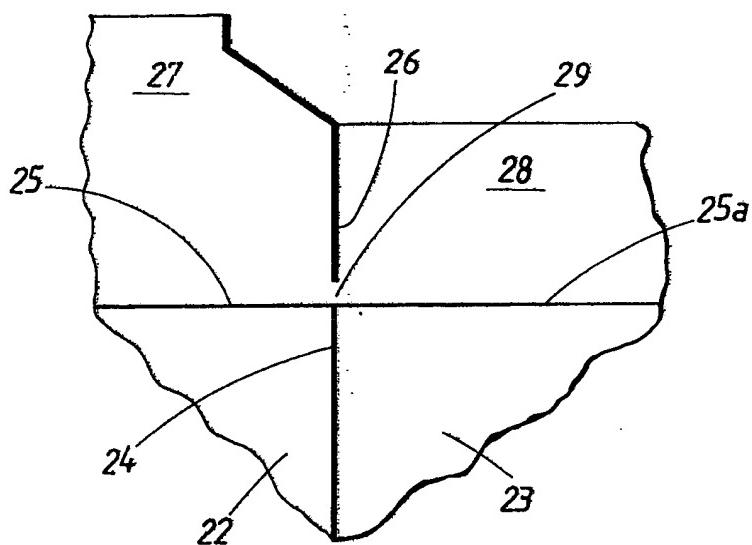


FIG. 2

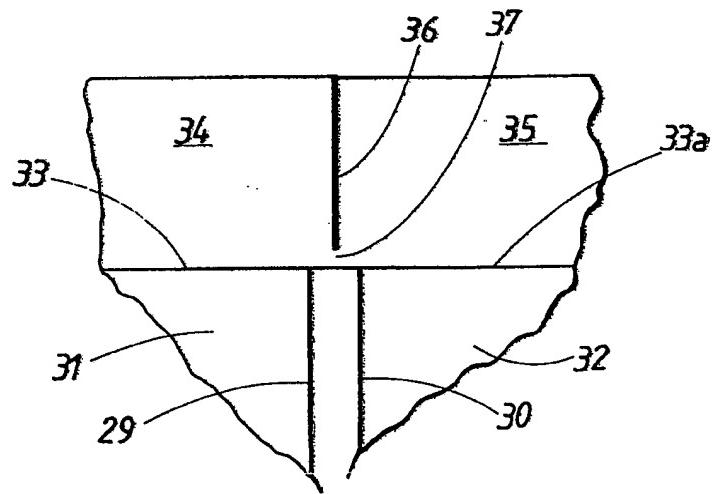


FIG. 3

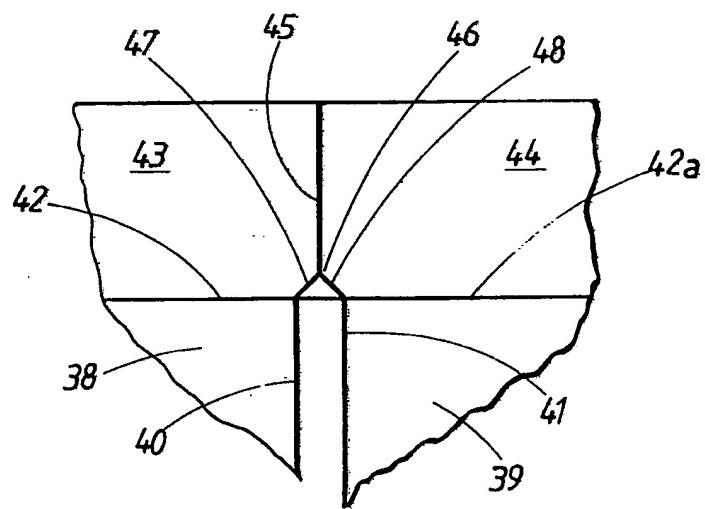


FIG. 4

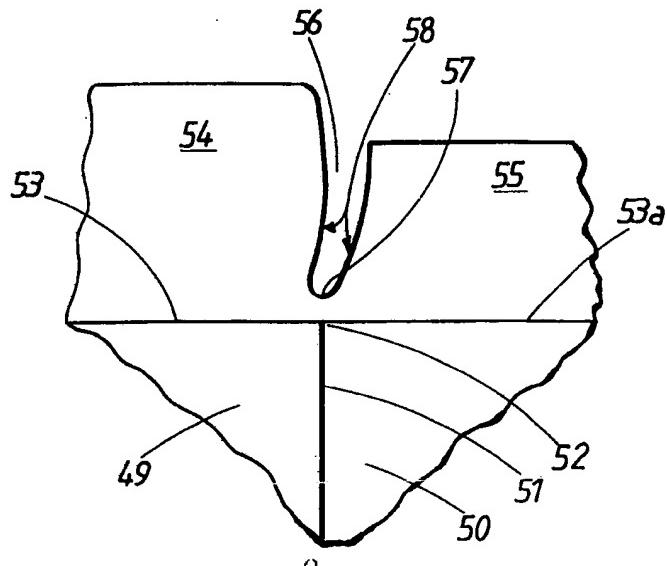


FIG. 5

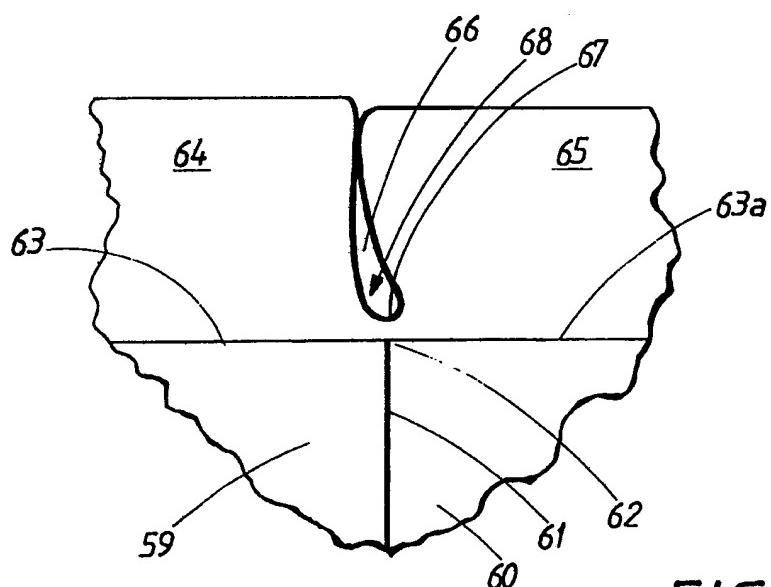


FIG. 6

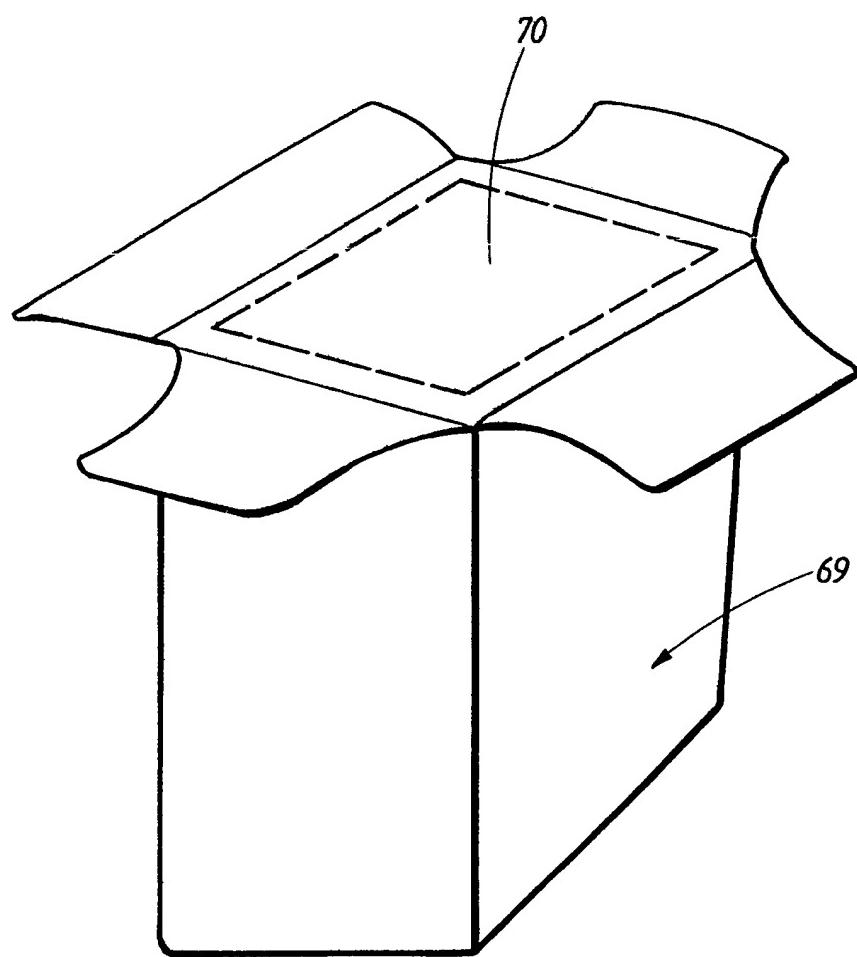


FIG. 7



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## EUROPEAN SEARCH REPORT

Application Number

EP 88 85 0243

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. CL.4)						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim							
D, X	US-A-3 040 958 (HAGAN) * Column 3, lines 30-51; figures 1-5 *	1	B 65 D 5/02						
Y	---	2-5	B 65 D 5/42						
X	CH-A- 327 604 (AKERLUND) * Page 3, left-hand column, line 32 - right-hand column, line 75; figures 1-3 *	1	B 65 D 5/56						
Y	---	2-5							
X	EP-A-0 199 697 (WINTERLING) * Column 3, line 39 - column 4, line 42; figures 2-4 *	1, 3-5							
	-----								
			TECHNICAL FIELDS SEARCHED (Int. CL4)						
			B 65 D						
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>04-10-1988</td> <td>NEWELL P.G.</td> </tr> </table> <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone      Y : particularly relevant if combined with another document of the same category      A : technological background      O : non-written disclosure      P : intermediate document</p> <p>T : theory or principle underlying the invention      E : earlier patent document, but published on, or after the filing date      D : document cited in the application      L : document cited for other reasons      .....      &amp; : member of the same patent family, corresponding document</p>				Place of search	Date of completion of the search	Examiner	THE HAGUE	04-10-1988	NEWELL P.G.
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